



# PHYSICS NMDCAT

## TOPIC WISE TEST (UNIT-3)

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**SAEED MDCAT TEAM**

### TOPICS:

#### ✓ Rotational and Circular motion

- Q. 1** A stone tied to a string is rotated in a circle. If the string is cut, the stone flies away from the circle because
- A. A centrifugal force acts on the stone      B. Of its inertia  
C. A centripetal force acts on the stone      D. Reaction of the centripetal force
- Q. 2** A particle comes round a circle of radius 1 m once. The time taken by it is 10 sec. The average velocity of motion is
- A.  $0.2 \pi \text{ m/s}$       B.  $2 \pi \text{ m/s}$   
C. 2 m/s      D. Zero
- Q. 3** The acceleration of a train travelling with speed of 400 m/s as it goes round a curve of radius 160 m, is
- A.  $1 \text{ km/s}^2$       B.  $100 \text{ m/s}^2$   
C.  $10 \text{ m/s}^2$       D.  $1 \text{ m/s}^2$
- Q. 4** An aircraft executes a horizontal loop of radius 1 km with steady speed of 900 km/h. What is its centripetal acceleration?
- A.  $250 \text{ km/s}^2$       B.  $75 \text{ m/s}^2$   
C.  $62.5 \text{ m/s}^2$       D.  $60 \text{ m/s}^2$
- Q. 5** In equation  $\vec{a} = \vec{\alpha} \times \vec{r}$   $90^\circ$  is angle between
- A.  $\vec{a}$  and  $\vec{\alpha}$       B.  $\vec{r}$  and  $\vec{a}$   
C.  $\vec{r}$  and  $\vec{\alpha}$       D. All of these
- Q. 6** A particle of rigid body is at a distance 0.1 m from axis of rotation to rotate with linear speed 3 m/s. What is angular speed of the rigid body
- A.  $0.3 \text{ rad/s}$       B.  $30 \text{ rad s}^{-1}$   
C.  $3 \text{ rad s}^{-1}$       D.  $1.5 \text{ rad/s}$
- Q. 7** If E is the K.E of body moving in circle of radius r then the centripetal force may be written as
- A.  $F_c = \frac{E}{2r}$       B.  $F_c = \frac{E}{2r^2}$   
C.  $F_c = E \times 2r$       D.  $\frac{2E}{r}$
- Q. 8** Which of given is correct formula of centripetal force
- A.  $\vec{F} = \frac{mv^2}{r} \hat{r}$       B.  $\vec{F} = \frac{mv^2}{r^2} \hat{r}$   
C.  $\vec{F} = m\omega^2 \hat{r}$       D.  $\vec{F} = m\omega^2 (-\hat{r})$
- Q. 9** A car of mass 1000 kg is moving with speed 72 km/h in a circular track of radius 100 m. The centripetal force acting on it is
- A. 4 N      B. 400 N  
C. 40 N      D. 4000 N
- Q. 10** All particles of a rigid body rotating about a fixed axis may not have same
- A. Speed      B. Axis of rotation  
C. Angular displacement      D. Direction of angular velocity
- Q. 11** A body moves in a circle of radius 4 m with constant speed 8 m/s experiences centripetal force 128 N. What is the mass of body?
- A. 2 Kg      B. 8 Kg



- C. 4 Kg  
D. 16 Kg
- Q. 12** Centripetal force may be equal to
- A.  $\frac{mv^2}{r}$   
B.  $\frac{pv}{r}$   
C.  $\frac{p^2}{mr}$   
D. All of these
- Q. 13** The direction of linear velocity of body moving in a circle is
- A. Along the axis of rotation  
B. Directed towards the center  
C. Along the tangent  
D. Directed away from the center
- Q. 14** When a body is whirled in a horizontal circle by means of a string the centripetal force is supplied by
- A. Mass of body  
B. Tension in the string  
C. Velocity of body  
D. Centripetal acceleration
- Q. 15** What is outward force acting on a mass of 10 kg when rotating at one end on an inelastic string 10m long at speed of 1m/s?
- A. 1 N  
B. 2 N  
C. 10 N  
D. 100N
- Q. 16** When a body is moving along a circular path it covers a certain angle in a given interval of time. Such type of motion is
- A. Vibratory motion  
B. Rotatory motion  
C. Linear motion  
D. Angular motion
- Q. 17** The angle subtended by an arc equal to radius is
- A. 1 rad  
B. One degree  
C. 1 Revolution  
D. All of these
- Q. 18** If a particle moves in a circle describing equal angles in equal times, its velocity vector
- A. Remains constant  
B. Changes in magnitude  
C. Changes in direction  
D. Changes both in magnitude and direction
- Q. 19** A motor cyclist going round in a circular track at constant speed has
- A. Constant linear velocity  
B. Constant acceleration  
C. Constant angular velocity  
D. Constant force
- Q. 20** The angular velocity of a particle rotating in a circular orbit 100 times per minute is
- A. 1.66 rad/s  
B. 10.47 rad/s  
C. 10.47 deg/s  
D. 60 deg/s
- Q. 21** Which of the following statements is false for a particle moving in a circle with a constant angular speed?
- A. The velocity vector is tangent to the circle  
B. The acceleration vector is tangent to the circle  
C. The acceleration vector points to the centre of the circle  
D. The velocity and acceleration vectors are perpendicular to each other
- Q. 22** The number of revolutions in  $3\pi$  radians
- A. 2  
B. 3  
C.  $3/2$   
D.  $1/2$
- Q. 23** The tension in the string revolving in a vertical circle with a mass m at the end which is at the lowest position.
- A.  $\frac{mv^2}{r}$   
B.  $\frac{mv^2}{r} + mg$   
C.  $\frac{mv^2}{r} - mg$   
D. mg
- Q. 24** A string can withstand a tension of 25N. What is the greatest speed at which a body of mass 1 kg can be whirled in a horizontal circle using 1 m length of the string?
- A.  $10\text{ms}^{-1}$   
B.  $7.5\text{ms}^{-1}$   
C.  $5\text{ms}^{-1}$   
D.  $2.5\text{ms}^{-1}$





- Q. 25 A body moving along a circular path completes a round trip. The displacement is  
A.  $4\pi R$   
B.  $2\pi R$   
C. Zero  
D. None
- Q. 26 The direction of centripetal force is  
A. Towards velocity  
B. Towards centre  
C. Away from centre  
D. No direction
- Q. 27 A Wheel of radius 50 cm having an angular speed of  $5 \text{ rad s}^{-1}$  have linear speed  
A.  $1.5 \text{ ms}^{-1}$   
B.  $3.5 \text{ ms}^{-1}$   
C.  $4.5 \text{ ms}^{-1}$   
D.  $2.5 \text{ ms}^{-1}$
- Q. 28 A wheel of radius 2 m turns through an angle of  $57.3^\circ$ . It lays out a tangential distance:  
A. 2m  
B. 4m  
C. 57.3m  
D. 114.6m
- Q. 29 The angular velocity of the minute hand of a clock is:  
A.  $2\pi \text{ rad s}^{-1}$   
B.  $\pi \text{ rad s}^{-1}$   
C.  $\frac{\pi}{60} \text{ rad s}^{-1}$   
D.  $\frac{\pi}{1800} \text{ rad s}^{-1}$
- Q. 30 A wheel of diameter 1 m makes 60 rev/min. The linear speed of a point on its rim in  $\text{ms}^{-1}$  is  
A.  $\pi$   
B.  $2\pi$   
C.  $\frac{\pi}{2}$   
D.  $3\pi$
- Q. 31 A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion takes place in a plane. It follows that  
A. Its velocity is constant  
B. Its acceleration is constant  
C. Its motion is linear  
D. Its motion is circular
- Q. 32 An object is moving in a circle of radius 100 m with a constant speed of 31.4 m/s. What is its average speed for one complete revolution?  
A. Zero  
B. 3.14 m/s  
C. 31.4 m/s  
D.  $\sqrt{2} \times 31.4 \text{ m/s}$
- Q. 33 If a body of mass m is rotating in a circle of radius r with frequency of rotation "f" then centripetal force acting on it is  
A.  $2\pi m r f$   
B.  $4\pi^2 m r f$   
C.  $4\pi^2 m r f^2$   
D.  $\pi^2 m r f^2$
- Q. 34 A body rotating with angular velocity of 2 radian/s and linear velocity is also  $2 \text{ ms}^{-1}$ , then radius of circle is:  
A. 1 m  
B. 0.5 m  
C. 4 m  
D. 2 m
- Q. 35 Angular form of centripetal acceleration  $a_c =$  \_\_\_\_\_  
A.  $\omega^2 \vec{r}$   
B.  $\omega \vec{r}$   
C.  $-\omega^2 \vec{r}$   
D.  $-\omega \vec{r}$
- Q. 36 The angular speed in radians/hours for daily rotation of our earth is  
A.  $2\pi$   
B.  $4\pi$   
C.  $\frac{\pi}{6}$   
D.  $\frac{\pi}{12}$
- Q. 37 The SI unit of angle acceleration is:  
A.  $\text{rad/sec}^2$   
B.  $\text{rad/sec}$   
C.  $\text{rev/sec}^2$   
D.  $\text{rev/sec}$
- Q. 38 One radian is equal to:  
A.  $2\pi \text{ rev}$   
B.  $\frac{\pi}{4} \text{ rev}$



C.  $\frac{\pi}{2} \text{ rev}$

D.  $\frac{1}{2\pi} \text{ rev}$

**Q. 39** Revolution per minute is unit for

A. Angular displacement

B. Angular velocity

C. Angular acceleration

D. Time



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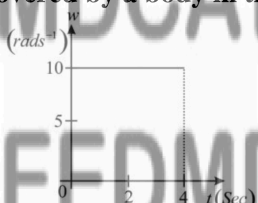
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- Q. 40  $1 \frac{\text{rev}}{\text{min}}$  is equal to:
- A.  $\frac{\pi}{6} \text{ rad s}^{-1}$  B.  $\frac{\pi}{15} \text{ rad s}^{-1}$   
C.  $\frac{\pi}{20} \text{ rad s}^{-1}$  D.  $\frac{\pi}{30} \text{ rad s}^{-1}$
- Q. 41 A body of mass 100 g is being revolved in circular path of radius 1m with constant speed of 10 m/s, the work done by the centripetal force over a complete cycle is
- A. 20 J B.  $20 \pi$  J  
C.  $10 \pi$  J D. Zero J
- Q. 42 A flywheel gains a speed of 540 rpm in 6 second. Its angular acceleration is
- A.  $3 \pi \text{ rad s}^{-2}$  B.  $6 \pi \text{ rad s}^{-2}$   
C.  $9 \pi \text{ rad s}^{-2}$  D.  $12 \pi \text{ rad s}^{-2}$
- Q. 43 A wheel rotates about an axis passing through the center and perpendicular to the plane with slowly increasing angular speed. Then it has
- A. Radial velocity and radial acceleration  
B. Tangential velocity and radial acceleration  
C. Tangential velocity and tangential acceleration  
D. Tangential velocity but acceleration having both components
- Q. 44 If a wheel of radius r turns through an angle of  $30^\circ$ , then the distance through which any point on its rim moves is
- A.  $\frac{\pi}{3} r$  B.  $\frac{\pi}{6} r$   
C.  $\frac{\pi}{30} r$  D.  $\frac{\pi}{180} r$
- Q. 45 The period of a circular motion is given by
- A.  $T = r v$  B.  $T = \omega w$   
C.  $T = 2\pi \omega$  D.  $T = 2\pi/\omega$
- Q. 46 A stone of mass 250 g is tied to the end of a string of length 1.0 m. It is whirled in a horizontal circle with a frequency of 30 rev./min. What is the tension in the string?
- A.  $\frac{\pi^2}{4} \text{ N}$  B.  $\frac{\pi^2}{2} \text{ N}$   
C.  $\pi^2 \text{ N}$  D.  $2\pi^2 \text{ N}$
- Q. 47 A cyclist turns around a curve at 15 miles/hour. If he turns at double the speed, the tendency to overturn is
- A. Quadrupled B. Halved  
C. Unchanged D. Doubled
- Q. 48 A body is moving along a circular path with variable speed. It has
- A. A radial acceleration B. A tangential acceleration  
C. Zero acceleration D. Both tangential and radial acceleration
- Q. 49 The angular displacement covered by a body in the following graph is
- 
- A. 40 rev B. 20 rev  
C. 30 rad D. 40 rad
- Q. 50 The angle described in 2sec by an object rotating at a rate of 600 rpm is
- A.  $20\pi \text{ rad}$  B.  $40\pi \text{ rad}$   
C.  $5\pi \text{ rad}$  D. Zero



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# Phy T-3

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